

8.12 PBS SR-0012/12X Spent Nuclear Fuels Stabilization and Disposition/Storage Operations Awaiting Geologic Repository

This section combines the narratives, scope, cost, and schedule for the Project Baseline Summaries (PBS) SR-0012, which is legacy spent nuclear fuel (SNF), and SR-HQ-SNF-0012X, which is non-legacy SNF.

8.12.1 Background

The Savannah River Site (SRS) Spent Fuel Project (SFP) receives and stores spent nuclear fuel in L Basin. This includes programmatic and physical support efforts related to safe storage and preparation for final disposition of SRS SNF inventories that remain after FY 2004. The current L Basin SNF inventory originated from Atomic Energy Commission reactors, DOE reactors, Domestic Research Reactors (DRR), and Foreign Research Reactors (FRR). The end of the Cold War and the sudden termination of materials production at SRS left a large inventory of irradiated SNF and other materials in underwater storage in three storage basins: the K and L production reactor disassembly basins, and the Receiving Basin for Off-site Fuel (RBOF). The condition of some of these legacy fuels was identified in the Defense Nuclear Facility Safety Board (DNFSB) Recommendation 94-1 and subsequent Recommendation 2000-1, concerning the need to ensure safe interim storage of the SNF and the need to stabilize the degraded spent fuel. K Basin and RBOF have been deinventoried of all SNF through either stabilization or transfer to L Basin. The Mk-16B and Mk-22 fuel assemblies identified in the DNFSB Recommendation 94-1 were shipped from L Basin to H Canyon for stabilization. L Basin will continue to receive offsite shipments of FRR SNF (nonlegacy) through FY 2014 and DRR SNF (both legacy and nonlegacy) through FY 2019. Several options are being evaluated for final disposition of the remaining SNF inventory.

8.12.2 End State

The end state for this project is deinventory and deactivation of the L Basin and the new Treatment and Storage Facility (TSF). These facilities will be maintained in a minimal surveillance and maintenance condition until transferred to PBS SR-0040 for final decommissioning.

8.12.3 Scope and Description

The scope of this PBS includes all programmatic and physical support efforts related to safe receipt and storage of SNF in L Basin and the final disposition of all SNF at SRS. Heavy water will continue to be stored in L Area pending disposition via sale or other approved method. This PBS also covers deactivation and surveillance and maintenance until turnover to decommissioning.

SFP is making key infrastructure improvements to ensure the continued safe receipt and storage of SNF in L Basin. The L Basin sand filter is being replaced to maintain

the quality of the L Basin water. Additional L Area Storage Racks (LASR) are being installed to provide increased SNF storage capacity in L Basin to meet the current forecast needs of FRR and DRR fuel receipts. Upgrades to the fire protection system in L Basin are being performed. Nuclear Incident Monitor replacements and VMACS (remote monitoring of L Area from K Area) are additional improvement being planned for L Basin.

A TSF will be built to package the SNF into DOE standardized canisters and provide subsequent interim storage. The canisters will be shipped to Yucca Mountain for final disposal.

8.12.4 Responsibilities

In addition to the overall responsibilities identified in Section 4.3, PBS-specific responsibilities are summarized as follows.

This PBS falls under the responsibility of the DOE-SR Assistant Manager for Nuclear Materials Stabilization Project. In accordance with DOE Order 413.3, *Program and Project Management for the Acquisition of Capital Assets*, a Federal Project Director has been identified to manage this PBS and will be approved by EM-1. The Federal Project Director uses an Integrated Project Team (IPT) approach to manage the PBS. The IPTs are comprised of personnel from a wide variety of disciplines to ensure the work is managed safely and effectively.

The performance of the work scope for this PBS is the responsibility of the management and operating (M&O) contractor. Currently, the contractor is Westinghouse Savannah River Company (WSRC). Within WSRC, the responsibility for this work scope resides with the Operations Business Unit Manager.

8.12.5 Schedule

L-Basin and L-Area facilities will operate until FY 2020 to receive, store, and ship SNF. FRR receipts will continue until FY 2014. DRR receipts will continue until FY 2019. A Treatment and Storage Facility designed to package fuel in a "Road Ready Package" system will begin operation in FY 2010 and shipments of SNF to Yucca Mountain will begin in FY 2011. The deinventory of L Basin and the completion of SNF shipping will be complete by FY 2020, after which the L Basin and L Area facilities will be deactivated and maintained in a minimal surveillance and maintenance condition until transferred to PBS SR-0040 for final decommissioning.

8.12.6 Resources

The cost profile for this PBS for FY 2004-2025 is TBD. This funding profile reflects an extension of the FRR and DRR programs to FY 2014 and FY 2019, respectively. It also reflects a 3-yr acceleration in the start of TSF operations from the FY2002 PMP. The acceleration of the SNF disposition treatment and packaging was made to coincide with the shipping schedule for the SRS glass waste canisters. The co-disposal array utilizes the inner space as an SNF canister disposal position.

This EM cost profile assumes funding from WN02 as detailed as follows (see Section 8.12.7).

Table 8.12.6.1 - TBD

Technology Needs

In addition to the aforementioned resource requirements, the following technology needs have been identified in support of accelerated cleanup:

- § Development of technical basis for standards for interim wet and dry storage of SNF.
Benefit: Safe storage at reduced costs
Development timeframe: FY 2004 – FY 2005
- § Re-define the operating corrosion envelope to reduce conservatism in the bounding basin water chemistry envelope.
Benefit: Safe storage at reduced costs
Development timeframe: FY 2004 – FY 2006
- § Water radiolysis and transportation of SNF (Hydrogen is generated during water radiolysis, which can buildup and cause problems for shipping and transportation.).
Benefit: Defines the ability to safely ship these fuels/reduces costs from elimination of storage areas/reduces risks
Development timeframe: FY 2004 – FY 2006
- § Corrosion performance of aluminum/zirconium/stainless steel (Al/Zr/SS) clad fuels at SRS (predictive modeling for extended storage of Al/Zr/SS clad fuels in SRS basins).
Benefit: Reduces risk of release of materials/criticality from storage of these fuels
Development timeframe: FY 2004 – FY 2006
- § Development of insoluble neutron poison materials for SNF storage and disposition.
Benefit: Prevents/minimizes criticality if the system degrades completely
Development timeframe: FY 2005 – FY 2006
- § Understanding colloid formation from interactions between SNF, storage containers, and defense high-level waste glass.
Benefit: Prevents/minimizes criticality and public exposure/dose if the system degrades in the repository
Development timeframe: FY 2005 – FY 2006
- § Develop closure welds for SNF packages/storage containers.
Benefit: Prevents/minimizes criticality and public exposure/dose if the system degrades in the repository
Development timeframe: FY 2005 – FY 2007

8.12.7 Key Assumptions, Agreements, Alternatives, Trade-offs, and Risk Management

Key Assumptions

The following key assumptions have been used as the basis for the lifecycle cost and schedule development:

- § FRR receipts will continue through 2014
- § DRR receipts will continue through 2019
- § Construct and operate a SNF direct disposal system for packaging fuel into DOE standardized canisters and subsequent interim storage
 - Begin Conceptual Design in 2007
 - Begin Construction in 2008
 - Startup Operations in 2010
- § Shipments to Yucca Mountain are assumed to begin in FY 2011
- § Deinventory basin and TSF and complete shipping to Yucca Mountain by FY 2020
- § All heavy water will be transferred offsite at no net cost prior to 105-L deactivation
- § WN02 annual funding planning guidance assumption: FY 2004 - \$8,300,000; FY 2005 - 2009 - \$8,000,000; FY 2010 - 2014 \$3,000,000.
- § The SNF project and program activities are conducted in a single SRS facility (L Area). Funding is provided from three sources based on SNF origin and receipts in the 'Work for Others' account. The total of the three sources is required to fully support program activities
- § FRR from Canada is not included in this submission per guidance received from DOE. Addition of the Canadian SNF receipts will require significant resource adjustments
- § Critical site infrastructure will remain available to support continued operations through the identified program life or suitable replacements will be secured and on-line before existing services are discontinued
- § This estimate assumes continuation of the current Safeguards and Security posture in L-Basin.

Agreements

The following agreements are drivers for this project:

- § DNFSB Recommendation 2000-1
- § SRS SNF Management EIS Record of Decision.

Alternatives, Trade-offs, and Risk Management

The following risks in achieving the PBS objectives have been identified:

- § The TSF may not be available by 2010. Delays to this project could extend the L-Area baseline schedule thereby increasing lifecycle costs by approximately \$40 million per year (FY2004 constant dollars)
- § Compressing the TSF project schedule presents significant cost and schedule risk
- § SNF may be identified which is not suitable for direct disposal to Yucca Mountain. This SNF would require an alternate disposition path if H Canyon is not available

- § Identification of participating countries could result in more (or fewer) SNF receipts than estimated. The TSF design throughput should be adjusted to be capable of supporting SNF treatment and packaging completion by 2020
- § Additional fuel may be received due to the extension of the FRR and DRR programs. If current capacity is exceeded, additional racks or storage capacity may be required.

8.12.8 Performance Monitoring and Evaluation

8.12B.8.1 HQ Monitoring and Evaluation

Monitoring of this PBS at the HQ level is completed primarily through use of the Integrated Planning, Accountability, and Budget System (IPABS) system. Actual cost, schedule, and performance data are collected for each PBS and compared to the established baseline. All elements of the lifecycle baseline are under EM-HQ configuration control. Performance data include the Gold Metrics and the Budget Milestones. Progress toward these measures and any proposed changes to them are provided as follows.

Gold Metrics

Packaged and Shipped for Disposition Metric Tons of Heavy Metal

	Original PMP	FY2004 PMP Revision
FY03	1.972 (actual)	1.972 (actual)
FY04	0.850 (actual)	0.850 (actual)
FY05		
FY06		
FY07		
FY08		
FY09		
FY10		
FY11		1.708
FY12		3.406
FY13		3.406
FY14		3.406
FY15	5.517	3.406
FY16	5.517	3.407
FY17	5.517	3.407
FY18	5.517	3.407
FY19	5.517	3.407
FY20	5.517	3.407
Total	35.925	35.189

Delta 0.736

Basis for change: The overall metric is determined by participation of eligible countries and the planning assumptions provided by the Department. There have been numerous SNF receipt schedule changes since the inception of the 2002 PMP. In FY 2003 FRR receipts, for example, OSIRIS (France) decided not to participate and Sweden delayed shipment a year. Receipt assumptions from Canada have been

revised to '0' from a partial participation planning assumption. In addition, 10 of 21 DRR were resequenced from FY 2003 to FY 2004. These assumptions remain subject to future change. Countries still have the option to participate, or not participate, through FY 2009 and beyond, pending extension of the receipt program.

Budget Milestones

[Note: Budget milestones are currently loaded into IPABS. These and any proposed new milestones are listed here with current due dates and any proposed changes with justification]

Milestone	Proposed	Current
Milestone #1	Delete	9/30/05
Milestone #2	Delete	9/30/06

Basis for change:

Milestones #1 & #2 – Current IPABS Milestones for FY2005 were seeded from old scope narrative and should be deleted.

Milestone	Proposed	Current
Milestone #3: Maintain L Area SNF receipt, storage and shipping facilities in an operable condition capable of supporting planned program requirements. (should be included in annual milestones through 2020)	Annual	
Milestone #4: Begin conceptual design for SNF Treatment and Storage Facility	10/01/06	
Milestone #5: Begin construction of the SNF Treatment and Storage Facility.	10/01/07	
Milestone #6: Complete TSF operational start-up	9/30/10	
Milestone #7: Begin shipments to federal repository (currently Yucca Mountain)	1/1/11	
Milestone #8: Complete FRR receipt program	9/30/14	
Milestone #9: Complete DRR receipt program	9/30/19	
Milestone #10: Complete shipments to federal repository (currently Yucca Mountain)	9/30/20	
Milestone #11: Complete L Area deactivation	9/30/22	
Milestone #12: Turnover for final disposition	10/1/22	

Basis for change:

Milestone additions resulted from SNF disposition project accelerations and the need to more completely reflect other programmatic activities.

8.12C.8.2 Site Monitoring and Evaluation

Refer to Section 4.3 for a description of the site's performance monitoring and evaluation process.